

G.S. IBADULLAYEVA, Y.S. DZHADRANOV, K.O. YESSETOVA, M.ZH. YERGAZINA,
M.K. AMIRKULOVA, G.B. AITZHANOVA, G.S. IBADULLAYEVA
Asfendiyarov KazNMU, Almaty, Republic of Kazakhstan

ANTIINFLAMMATORY ACTION OF THE PHARMACEUTICAL SUBSTANCE "EXKAIR" ON THE LUNGS OF GUINEA PIGS

One of the cardinal symptoms of the respiratory tracts inflammation is prolonged cough. Medical regimen of such pathological state includes administration of expectorant antiinflammatory drugs. Expectorant treatment is not always effective in those cases, hence it is necessary to use different new medicaments.

Key words: guinea pig, lung, bronchus

Actuality. One of the cardinal symptoms of the respiratory tracts inflammation is prolonged cough. Medical regimen of such pathological state includes administration of expectorant antiinflammatory drugs. Expectorant treatment is not always effective in those case [1,2,3,4,5], hence it is necessary to use different new medicaments.

At present the development and use of new drugs for treatment of such negative symptom as cough following airways involvement of different etiology is an urgent problem. Taking into consideration the above mentioned facts we carried out an experimental modeling of inflammatory process in breathing passages of laboratory animals which then were treated with investigated pharmaceutical substance "EXKAIR" (which represents mixture of CO₂-extract of *Acorus calamus*, CO₂-extract of *Calendula officinalis* L., and ascorbic acid). Preliminary investigation showed the entire absence of acute and chronic toxicity of "EXKAIR".

Methods. We carried out our tests on fifty males of guinea pigs three to four months in age and two hundred and eighty to three hundred grammes in weight. The animals were divided into five groups (ten guinea pigs in each group). The group №1 included intact animals. The guinea pigs of the groups №2, №3, №4, №5 included experimental animals which weren't given any food during fourteen to sixteen hours before beginning of the test with the purpose of prevention of vomiting reflex which may cause the aspiration of the respiratory tracts by vomit mass.

During the experiment the guinea pigs of the groups №2, №3, №4, №5 were put into special camera. Then with the help of ultrasonic pneumatic compressor the camera was filled with aerosol including ten to seventeen per cent solution of citric acid. Duration of the exposure was five minutes. The influence of citric acid caused cough. On the average the animals coughed twenty to thirty times during half a minute.

Twenty hours later the guinea pigs of the groups №2, №3, №4, №5 underwent single peroral introduction of drugs "EXKAIR" by means of tube. Animals of the group №2 were introduced with the drug in dose of 3 mg/kg, animals of the group №3 were introduced with drug in dose of 5 mg/kg, animals of the groups №4 were introduced with the drug in dose of 9 mg/kg, and animals of the group №5 were introduced with "EXKAIR" in dose of 25 mg/kg. By the seventh day after treatment the cough disappeared in animal of the groups №4 and №5. On the eighth day after treatment all the animals (including control group) were killed. Cranial parts of the lungs were taken and fixed in solution of formalin. Paraffin sections were stained with hematoxylin-eosin and investigated under light microscope [6,7,8,9].

Discussion. Histologically it was determined that from the outside the lungs of the guinea pigs of control group (group №1) are covered by thin serous tunic which consists of flattened mesothelium containing elongated densely stainable nuclei, and of sub epithelial connective tissue. The latter, in its turn, is made up of numerous cells having small nuclei and of fibres travelling parallel to the pulmonary surface. The thickness of the serous tunic is 6,79±0,13 micrometers. The bulk of the pulmonary parenchyma is occupied by alveoles between which there are bronchi of different sizes and numerous blood vessels filled with blood. The alveoles are lined by flattened alveolar epithelial cells containing elongated nuclei. There isn't any difference in diameter of the peripherally and centrally located alveoli. Alveoli located within the peripheral parts of the lung are 15,48±0,28 micrometers in diameter, and the diameter of the centrally located alveoli is 16,93±0,5 micrometers. The alveoli are separated from one another by mean of alveolar septa. The septa are composed of densely arranged cellular elements containing rounded and oval open-face nuclei, and of thin connective tissue fibres.

Mucous tunic of the bronchi is folded. In those bronchi which are more than four hundred micrometers in the inside diameter the folds are 64,72±1,7 micrometers in height. The ratio of the inside diameter of bronchus and the height of folds is 1/0,14, i.e. the folds overlap

only a very small part of the bronchial lumen. This fact is obviously caused by presence of a thick cartilage preventing the contraction of bronchial wall. Toward the smallest bronchi this ratio gradually decreases, because the folds overlap more and more part of the bronchial lumen. In bronchi the diameter of which is three hundred to four hundred micrometers the height of folds is 63,33±0,15 micrometers, and the ration of the inside diameter of bronchus and the height of folds is 1/0,18. In bronchi the diameter of which is two hundred to three hundred micrometers the height of folds is 63,57±0,12 micrometers, and the ration is 1/0,25. In bronchi the diameter of which is less than two hundred micrometers the height of folds is 56,2±0,1 micrometer, and the ratio is 1/0,28.

Inner surface of the bronchi are lined by pseudostratified epithelium. The open-face nuclei of the epithelial cells are located in middle and distal parts, they have conspicuous karyolemma. Toward the smallest bronchi the thickness of epithelium decreases due to reduction of cytoplasmic volume.

Bronchial lamina propria is penetrated by numerous capillaries. It is made up of a large amount of cellular elements containing different-shaped intensely stainable nuclei and thin connective tissue fibres.

Muscularis mucosae of bronchial mucous tunic represents the dense bundles of smooth muscle cells containing elongated slightly stainable nuclei. In those bronchi which are more than four hundred micrometers in diameter the muscularis mucosae is 81,47±3,07 micrometers in thickness. In those bronchi which are three hundred to four hundred micrometers in diameter the muscularis mucosae is 50,42±1,52 micrometers in thickness. In the bronchi which are two hundred to three hundred micrometers in diameter it is 30,24±0,6 micrometers in thickness. In the bronchi which are less than two hundred micrometers in diameter the thickness of the muscularis mucosae is 16,67±0,41 micrometers.

Bronchial wall contains cartilages. Towards the smallest bronchi the thickness of the cartilages decreases and their arrangement becomes irregular. In those bronchi which are more than four hundred micrometers in diameter the thickness of cartilages is 98,96±2,87 micrometers. In the bronchi which are three hundred to four hundred micrometers in diameter the cartilages are 65,75±2,6 micrometers in thickness. In the bronchi which are two hundred to three hundred micrometers in diameter they are 51,5±1,6 micrometers in thickness. In the bronchi which are less than two hundred micrometers in diameter the thickness of cartilages are 40,2±1,3 micrometers.

The cartilages are made up of chondrocytes which have conspicuous boundaries and homogeneous intercellular substance. Those chondrocytes which are located within peripheral zones of the cartilage are flattened in shape and are arranged separately, they contain closed face elongated nuclei. Such chondrocytes are 9,84±0,29 micrometers in diameter. The diameter of their nuclei is 4,84±0,3 micrometers. Within the central zones of cartilage the rounded oval and polyhedral chondrocytes are arranged either singly (among such chondrocytes there are binucleate) or in pairs. Their rounded and oval nuclei are open-face and have prominent karyolemma. Those chondrocytes are 17,1±0,65 micrometers in diameter, and the diameter of their nuclei is 5,9±0,17 micrometers.

While histologic investigating the lungs of guinea pigs of the groups №2, №3 it was determined prominent edema of the walls of large bronchi. The lumens of the bronchi were contracted.

In some zones the bronchial epithelium was cast off. Bronchial wall was impregnated by inflammatory infiltration. In some cases bronchial cartilage was considerably destroyed (fig. 3).

In medium-sized and small bronchi the peribronchial infiltration occurred. Surrounding blood vessels were plethoric.

In the lungs of guinea pigs of the groups №4, №5 the structural restoration occurred. Desquamation of the epithelium in large bronchi wasn't found. Bronchial cartilage was characterized by

ordinary structure. Structure of medium-sized and small bronchi was also restored.

Conclusion. Investigation of pharmaceutical substance “EXKAIR” showed prominent anti-inflammatory action on the lungs of guinea

pigs in case of its single peroral introduction in doses of 9 mg/kg and 25 mg/kg. That fact is followed by cessation of cough and structural restoration of pulmonary tissue.

REFERENCE

1. Чучалин А. Г., Абросимов В. Н. Кашель. Рязань: 2000. – 102 с.
2. Stalder H., Rochat Th. Toux chronique//Primary Care.-2003. - №3 - P. 648-652.
3. С. Овчаренко. Кашель: симптом легочных и внелегочных заболеваний//Врач, 2013 - №2 - С.2-5.
4. Зюзенков М. В. Лемешев А. Ф. Кашель в практике врача-терапевта // Медицинские новости, 2001. - № 10. - С. 22–26.
5. Даниляк И. Г. Кашель: этиология, патофизиология, диагностика, лечение // Пульмонология. 2001. - № 3. - С. 33–37.
6. Самсыгина Г. А. Противокашлевые препараты в педиатрии // Consilium medicum. 2001. - № 2. - С. 18–22.
7. Хабриев Р. У. Руководство по экспериментальному (доклиническому) изучению новых фармакологических веществ Второе изд., перераб. и доп. - М.: Медицина, 2005. - 832 с.
8. Popov S.V., Porova G.Y., Ovodova R.G. et al. // Fitoterapia. 2005. V. 76, № 3—4. P. 281—287.
9. Кузденбаева Р. С., Рахимов К. Д., Шин С. Н., Чуканова Г. Н. Доклиническое изучение местноанестезирующей активности новых биологически активных веществ. Методич. руковод. – Алматы: 2000. - 30 с.

Ғ.С. ИБАДУЛЛАЕВА, Е.С. ДЖАДРАНОВ, К.Ө. ЕСЕТОВА, Ж. ЕРГАЗИНАМ., М.К. АМИРКУЛОВА, Г.Б. АЙТЖАНОВА
С.Ж. Асфендияров атындағы ҚазҰМУ, Алматы, Қазақстан Республикасы

ТЕҢІЗ ШОШҚАЛАРЫНЫҢ ӨКПЕСІНЕ «ЭКСКАИР» ПРЕПАРАТЫНЫҢ ҚАБЫНУҒА ҚАРСЫ ӘСЕРІ

Түйіндемесі. Теңіз шошқаларына ауыз арқылы бір рет 5 және 9 мг/кг дозада «ЭКСКАИР» таблеткалары беріліп, препараттың жануарлар өкпесіне қабынуға қарсы әсері морфологиялық зерттеу әдістерінің көмегімен анықталды.

Түйінді сөздер: қабыну, теңіз шошқалары, өкпе, бронхтар

Ғ.С. ИБАДУЛЛАЕВА, Е.С. ДЖАДРАНОВ, К.О. ЕСЕТОВА, М.Ж. ЕРГАЗИНА, М.К. АМИРКУЛОВА, Г.Б. АЙТЖАНОВА
ҚазҰМУ им. С.Д. Асфендиярова, Алматы, Республика Қазақстан

ПРОТИВОВОСПАЛИТЕЛЬНОЕ ДЕЙСТВИЕ ПРЕПАРАТА «ЭКСКАИР» НА ЛЁГКИЕ МОРСКИХ СВИНОК

Резюме. С помощью морфологических методов было доказано противовоспалительное действие препарата «Экскаир» на лёгкие морских свинок при его однократном пероральном введении в дозах 9 и 5 мг/кг.

Ключевые слова: воспаление, морская свинка, лёгкое, бронхи